BYZANZ
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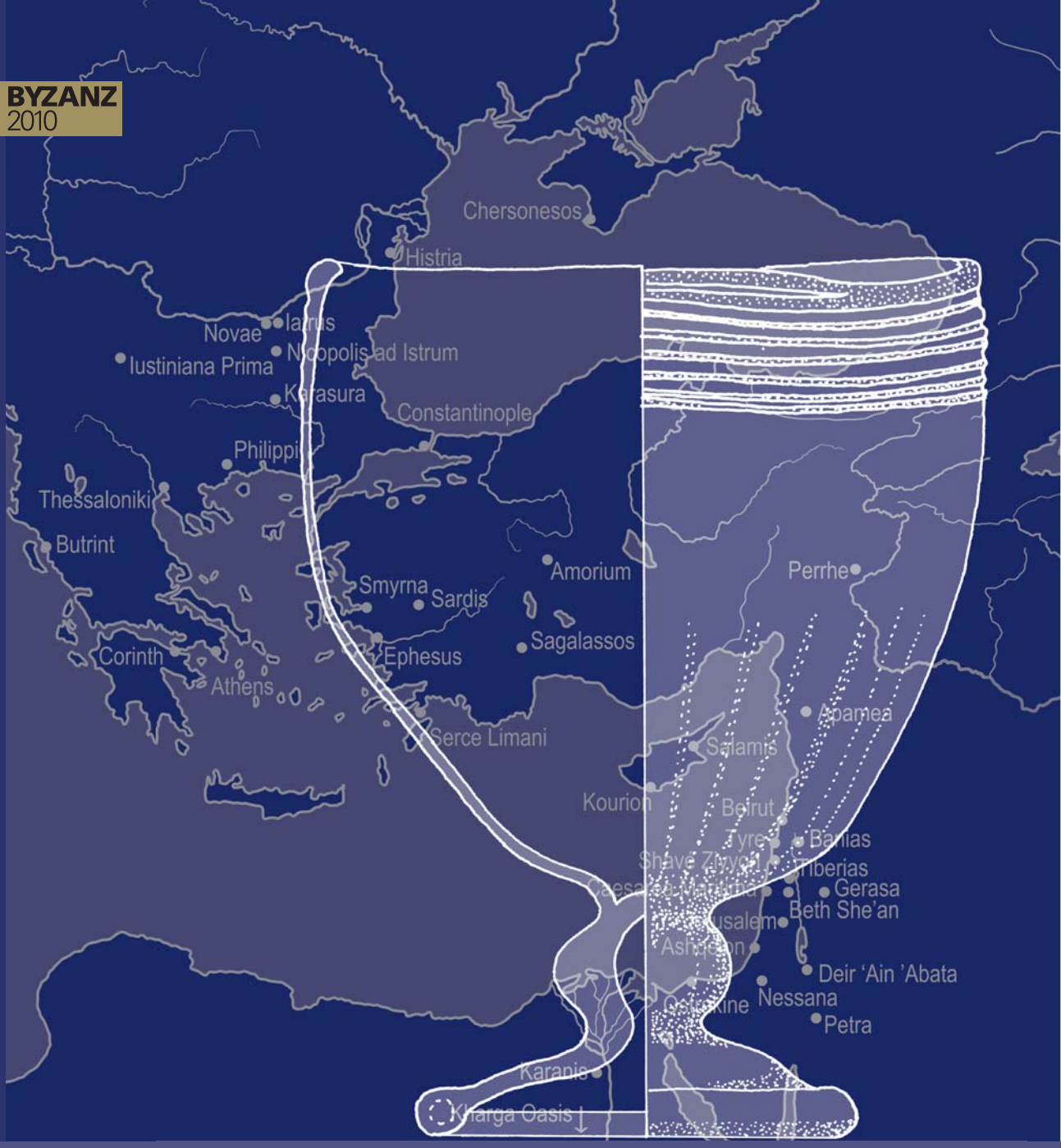

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Glass in Byzantium – Production, Usage, Analyses

Glas in Byzanz – Produktion, Verwendung, Analysen

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RGZM – TAGUNGEN
Band 8

Römisch-Germanisches
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Jörg Drauschke, Daniel Keller (eds)

GLASS IN BYZANTIUM – PRODUCTION, USAGE, ANALYSES

International Workshop organised by the
Byzantine Archaeology Mainz, 17th-18th of January 2008
Römisch-Germanisches Zentralmuseum

GLAS IN BYZANZ – PRODUKTION, VERWENDUNG, ANALYSEN

Internationaler Workshop der
Byzantinischen Archäologie Mainz, 17.-18. Januar 2008
Römisch-Germanisches Zentralmuseum

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GLASS IN BYZANTIUM –
PRODUCTION, USAGE, ANALYSES

The products of Byzantine glass-making workshops are found throughout the whole of the Mediterranean area and were also distributed into regions far beyond the borders of the Empire. Research into glass production and distribution in Byzantium has made enormous progress, especially in the last years. Thanks to state of the art scientific methods and a number of recent discoveries, it is not only possible today to identify centres of raw glass production, but also to trace additional trade routes to secondary workshops. Furthermore the results of this research have revealed details of the formulas used in glass production, the source of the raw products and the technologies employed.

The current state of this research was the subject of discussion at an international workshop hosted in January 2008 by the »Byzantine Archaeology Mainz«. Contributions to this conference dealt with a geographical area between North Africa, the Balkans, Asia Minor and the Near East. The focal point of the workshop was formed on the one hand by recent results of scientific analyses of glass and on the other hand by studies of regionally-specific expressions of Byzantine forms of glass. Thus research into Byzantine glass manufacture has once again produced highly interesting findings and permitted an insight into the diverse possibilities of modern analytical methods.

GLAS IN BYZANZ –
PRODUKTION, VERWENDUNG, ANALYSEN

Die Erzeugnisse byzantinischer Glaswerkstätten finden sich im gesamten Mittelmeerraum und erreichten auch weit entfernte Regionen jenseits der Reichsgrenzen. Die Erforschung der Glasproduktion und -verbreitung in Byzanz hat gerade in den letzten Jahren enorme Fortschritte erzielt: Dank modernster naturwissenschaftlicher Methoden und vielen Neufunden ist es heute möglich, Zentren der Rohglasherstellung zu identifizieren und den weiteren Vertriebsweg an sekundäre Werkstätten nachzuvollziehen. Die Ergebnisse geben darüber hinaus Auskunft über die verwendeten Glasrezepturen, die Herkunft der Rohstoffe und die angewandten Glastechnologien.

Der aktuelle Stand der Forschung wurde im Januar 2008 bei einem von der »Byzantinischen Archäologie Mainz« veranstalteten internationalen Workshop diskutiert. Die Beiträge der Tagung behandeln einen geographischen Raum zwischen Nordafrika, Balkan, Kleinasien und dem Nahen Osten. Den Schwerpunkt bilden einerseits aktuelle Ergebnisse naturwissenschaftlicher Glasanalysen, andererseits Studien zur regionalspezifischen Ausprägung byzantinischer Glasformen. So liefert die Erforschung der byzantinischen Glaskunst immer wieder hochinteressante Erkenntnisse und gibt einen Einblick in die vielfältigen Möglichkeiten moderner Untersuchungsverfahren.

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CONTENTS – INHALT

VEERLE LAUWERS · PATRICK DEGRYSE · MARC WAELKENS

MIDDLE BYZANTINE (10TH-13TH CENTURY A.D.) GLASS BRACELETS AT SAGALASSOS (SW TURKEY)

Located in the southwestern region of Turkey, Sagalassos is situated in what was known in Antiquity as Asia Minor, more specifically in Pisidia, where the town was primus inter pares. Utilising the Roman Via Sebaste that crossed the territory of Sagalassos, linking the territories of the coloniae of Conana and Comama, the city was able to develop its natural resources into a flourishing economy. The remains of a large potters' quarter and tons of locally produced Sagalassos red slip-ware (produced from Late Hellenistic times to the early 7th century A.D.) provide a good indication of this. In previous studies, the existence of a local glass workshop (presumably of Early Byzantine date, end 5th to 6th century A.D.) was also confirmed via chemical and archaeological analysis (Degryse et al. 2005; 2006; Lauwers et al. 2007a; 2007b).

The excavation programme that has continued for the last 20 years focuses on the monumental buildings that reflect the prosperity of the city in Roman and Early Byzantine times. By studying the glass, ceramic and metal finds generated from these contexts (mostly artefacts captured in levelling and dump layers), it was clear that the city was completely depleted upon abandonment and afterwards vanished from the collective memory. As such, Sagalassos did not suffer from any disturbances after the site's gradual abandonment in the 7th century A.D., except for the occasional goat or sheep herder.

In this study, however, the focus is on the glass bracelets retrieved from the Middle Byzantine occupation levels of so-called Alexander's Hill and of the former temple sites of Hadrian and Antoninus Pius and Apollo Klarios (fig. 1), since recent research has shown that, during the 8th to 13th centuries A.D., isolated hamlets, some of them fortified, continued to occupy parts of the former city (Vionis /Poblome / Waelkens in press).

The flat-topped conical Alexander's Hill controlled the southern main approach to the town. In the early 6th century A.D., a church was constructed that was most likely restored some four centuries later (10th-11th century A.D.). By this time, however, most of the Early Byzantine basilica had been largely dismantled and a cistern and circuit wall were added to the complex, perhaps in combination with the rich ceramic assemblage and the retrieved faunal remains, indicating a military function. The concentration of burials in the area around the apse of the Apollo Klarios basilica could be identified as a kind of »churchyard«. Skeletons from the graveyard were dated between the 11th and 13th century A.D. by ^{14}C, confirming the hypothesis that the graveyard was from the Middle Byzantine period. Within the former precinct of the temple of Hadrian and Antoninus Pius, a Middle Byzantine occupation level with no related structural evidence was excavated; this dates to the 8th to 9th century A.D. In addition, the glass material here consisted mostly of bracelets.

THE GLASS BRACELETS

Bracelets are considered to be a very common find at Middle Byzantine sites. In Sagalassos, too, the number of excavated fragments far outnumbered the vessel glass of the period. 113 items were excavated, only ten of which were complete and were retrieved from the graves around the church in the former temple of

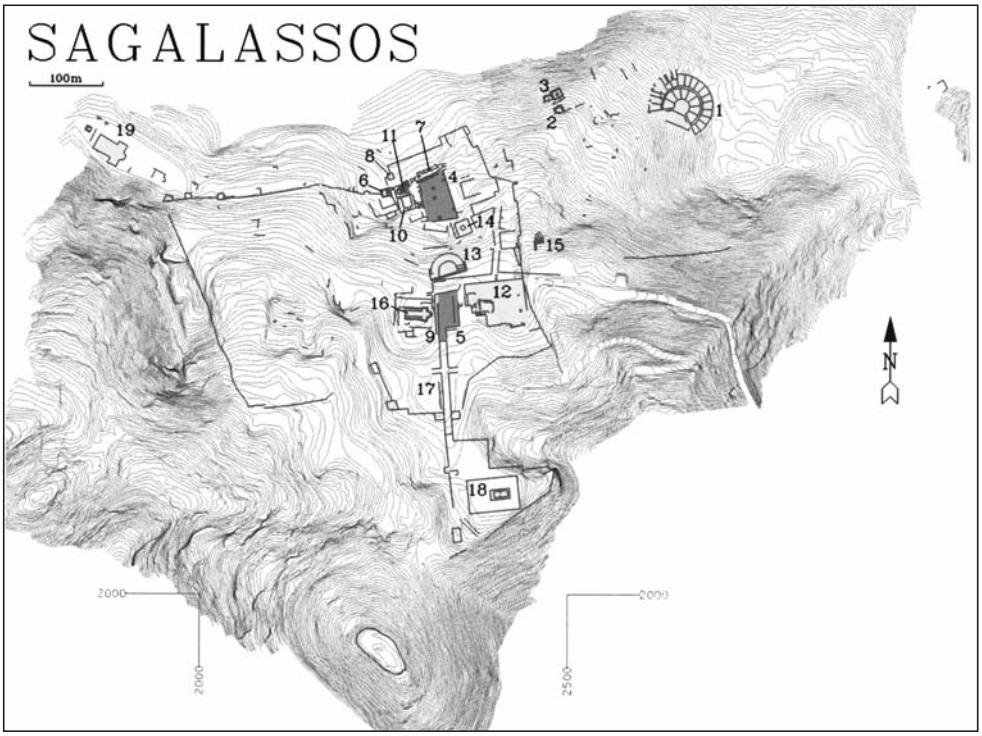

Fig. 1 Map of Sagalassos: **17** Apollo Klarios. – **18** Antoninius Pius. – **19** Alexander's Hill. – (E. Mahy).

Apollo Klarios. Since the nine types that were recognised occurred throughout all the assemblages, it is safe to presume that, for the kastron of Sagalassos, they can all be dated to the 10th to 13th century A.D. (Decupere et al. in press).

The following types could be recognised in the Middle Byzantine levels:

1. Seamless, plain, semi-circular bracelet (**fig. 2, 1**). A total of 15 items could be attributed to this type, in almost all cases made of either cobalt blue or green glass. The overall majority have an inner diameter of 60 or 70 mm. – See also Gill 2002, nos 544-562 (Amorium): Islamic, Middle Byzantine period; Spear 2001, nos 438-441: Late Roman, Byzantine period or later.
2. Seamless, plain, flat bracelet (**fig. 2, 2**). 16 items could be attributed to this type. The overall majority have a diameter of 70 or 80 mm. They occur in a wide range of colours, but cobalt blue is the most common. – See also Gill 2002, nos 544-562 (Amourium): Islamic, Middle Byzantine period; Spear 2001, nos 438-441: Late Roman, Early Byzantine period or later; Gürler 2005, nos 156-157 (Tire); Canav 1985, nos 167-169: Byzantine period, 5th to 15th century A.D.
3. Seamless, painted, flat bracelet (**fig. 2, 3**). One blue green and three cobalt blue bracelets could be attributed to this type. All are decorated with either yellow or white spiralling figures and lines. The bracelets themselves were made from blue green or cobalt blue glass. Only two, relatively large, inner diameters could be measured, being 70 and 90 mm. – See also Gill 2002, nos 489. 494. 498. 500. 506. 511. 520. 526. 535. 542. 555-556 (Amorium): Byzantine period; Gürler 2005, no. 160 (Tire): 10th to 13th century A.D.; Canav 1985, nos 170-172: Byzantine period, 5th to 15th century A.D.
4. Seamed, plain, circular bracelet (**fig. 2, 4**). 45 bracelets of this type were excavated. The majority having inner diameters of between 50 and 80 mm, which seems rather small to be used as a wrist bracelet,

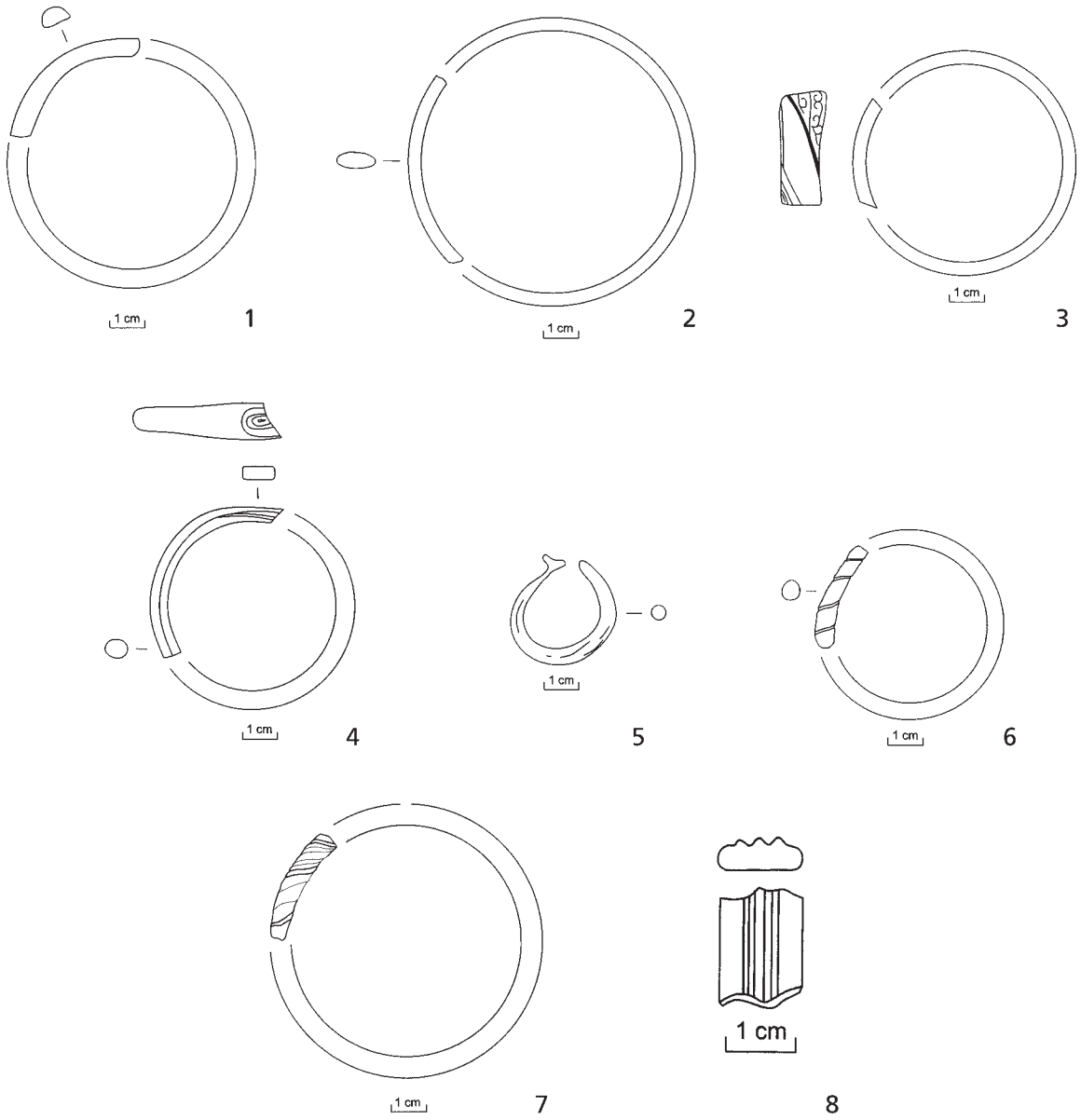

Fig. 2 Sagalassos: **1** seamless, plain, semi-circular bracelet. – **2** Seamless, plain, flat bracelet. – **3** Seamless, painted, flat bracelet. – **4** Seamed, plain, circular bracelet. – **5** Seamed, plain circular bracelet with ledge. – **6** Seamed bracelets with monochrome spirally-twisted trails. – **7** Seamed bracelets with bi-chrome spirally twisted, symmetrically fused trails. – **8** Seamed flat bracelet with moulded or tooled horizontal ribbing. – (Drawings E. Mahy).

unless of course these were intended for small children. 20 items were made of cobalt blue glass. Also, green and opaque red examples occur quite frequently. This type seems to be very common throughout all periods.

5. Seamed, plain circular bracelet with a ledge (fig. 2, 5). Only two items were encountered where the seam was shaped into a vertical ledge. The tool marks to the left of the ledge indicate that this was done intentionally. One item has a very small inner diameter of 34 mm, whereas the inner diameter on the other one was much larger (90 mm). For bracelets with such a small diameter, Gill suggested that

Fig. 3 Sagalassos: seamed, painted circular bracelet; black, left with yellow circles, right with light blue lines and spirals. – (Photo B. Vandermeulen).

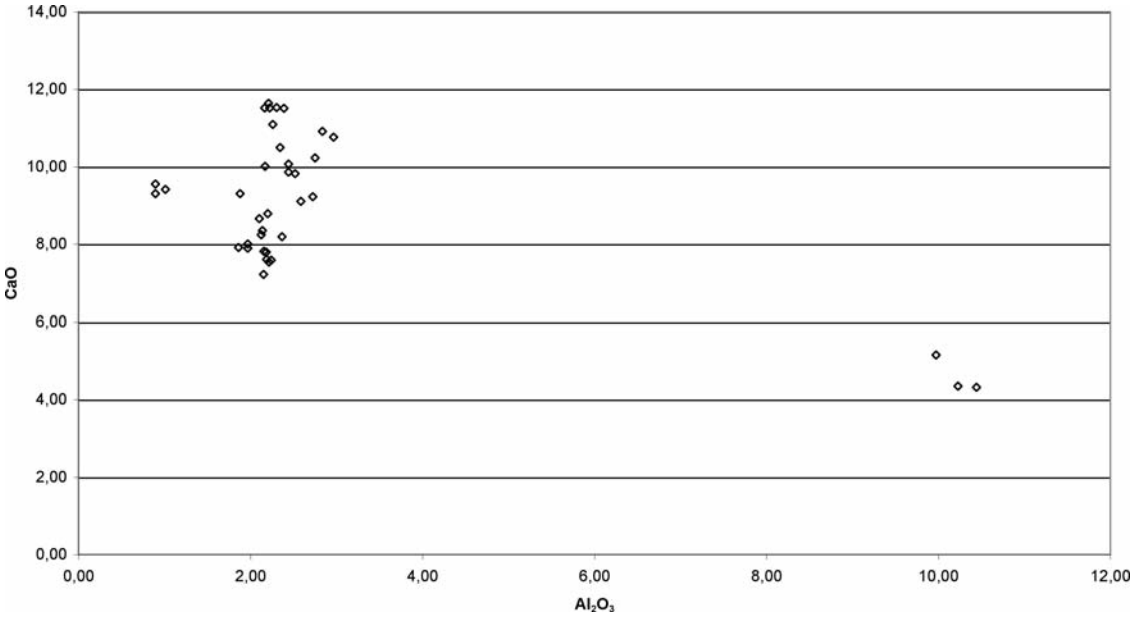

Fig. 4 Sagalassos: CaO-Al_2O_3 biplot of plant ash glass.

they may have been used as a thumb ring or ring handles belonging to hanging lamps (Gill 2002, 79). – Both examples are completely iridiscesed, but it seems that they were made from cobalt blue and green glass.

6. Seamed, painted circular bracelet (**fig. 3**). Without exception, these bracelets were made of cobalt blue and decorated with circles, lines and spirals, painted in white, yellow or pale blue enamel. Internal diameters vary between 34 and 80 mm. Since these bracelets are only decorated at the outside and the drawings do not seem distorted by the sealing and tooling of the cane, there is no reason to assume that the paint would have been applied on the straight cane, as was suggested by Gill (2002, 208). – See also Gill 2002 (Amorium): Middle Byzantine period, 10th to 12th century A.D.; Canav 1985, nos 164. 166: Byzantine period, 5th to 15th century A.D.
7. Seamed bracelets with monochrome spirally twisted trails (**fig. 2, 6**). Seven examples were recognised, possessing inner diameters varying between 50 and 90 mm. Most of the individuals were either cobalt blue or green. – See also Spear 2001, nos 462-465: unlikely to have appeared before the 4th century A.D.; Gill 2002, nos 423-448. 563-591 (Amorium): Late Roman and Byzantine period.
8. Seamed bracelets with bi-chrome spirally twisted, symmetrically fused trails (**fig. 2, 7**). Only one item with an inner diameter of 80 mm could be attributed to this type. Symmetrical red opaque trails were

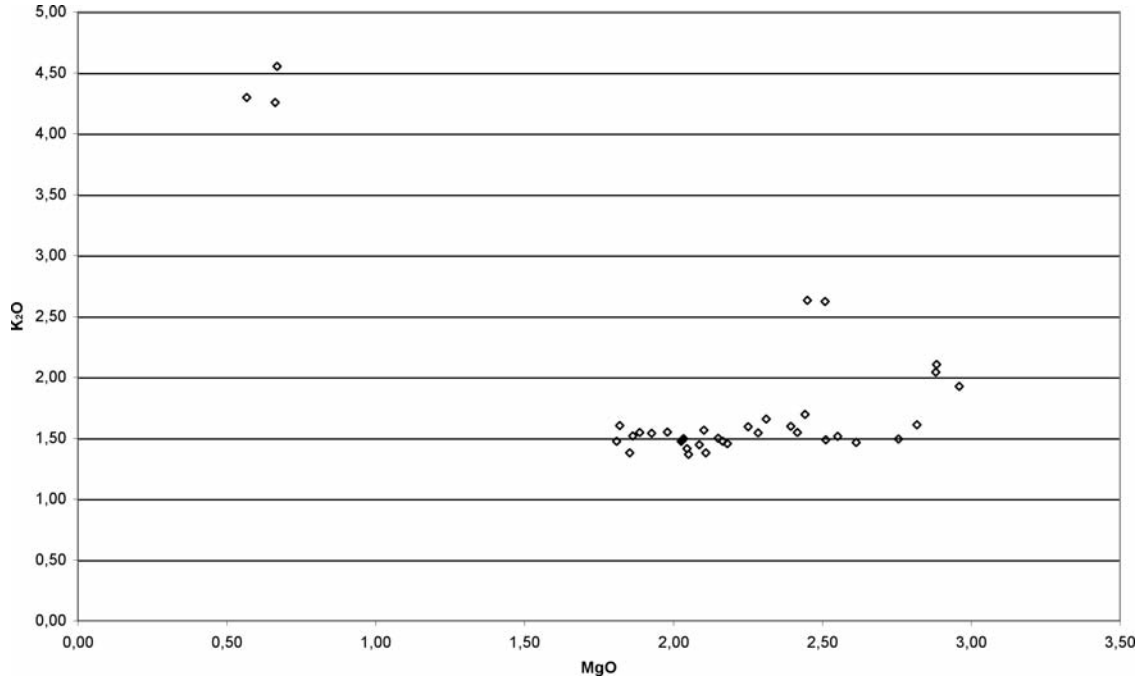

Fig. 5 Sagalassos: K_2O-MgO biplot of plant ash glass.

fused on a plain, cobalt blue bracelet. – See also Gill 2002, nos 449-467. 592-604 (Amorium): Late Roman and Byzantine period; Spear 2001, no. 467: Early Islamic, 8th century A.D.; Canav 1985, nos 154-156: Byzantine period, 5th to 15th century A.D.

9. Seamed flat bracelet with moulded or tooled horizontal ribbing (**fig. 2, 8**). Only one cobalt blue item could be identified as belonging to this type. Since it is so small, no inner diameter could be measured. – See also Spear 2001, no. 449: 5th to 7th century A.D.; Gill 2002, nos 764-768 (Amorium): Middle Byzantine period.

GEOCHEMICAL ANALYSIS

Two chunks of plant ash glass, in combination with glass bracelets and one vessel glass (14 samples in total), all retrieved from the three sites mentioned above, were analysed by microprobe. The majority of the plant ash glass shows a distinct composition with elevated aluminium levels (**fig. 4**) and lowered magnesium and potassium levels (**fig. 5**) compared with other plant ash glasses from the literature (Henderson et al. 2005, 665-673; Freestone et al. 2000, 65-74). The composition of the plant ash glass seems to form mixing lines in several biplots on several elements. This indicates that raw plant ash glass was mixed with remaining natron glass at Sagalassos, although further study is needed. An additional indication is found in the occurrence of elevated antimony levels in the bracelets, possibly remaining from recycling Roman colourless glass as found in Sagalassos. The high levels of soda compared with the levels in other plant ashes are also noteworthy, but these may be reminiscent of natron glasses as known from literature. Also, the levels of transition metals (zinc, chromium, copper) and lead are elevated (**tab. 1**).

Sample number	Period	Method	SiO_2 %	Al_2O_3 %	MgO %	Na_2O %	CaO %	K_2O %	TiO_2 %	FeO %	Cl %	MnO %	P_2O_5 %	ZnO %
SA07VL350	10th-11th	Microprobe	64,37	2,44	2,31	14,87	10,06	1,66	0,07	0,97	0,39	0,02	0,30	bd
	10th-11th	Microprobe	64,25	2,52	2,44	14,41	9,82	1,69	0,07	2,24	0,24	0,04	0,24	0,17
	10th-11th	Microprobe	56,71	2,84	2,55	12,67	10,91	1,51	bd	5,90	0,15	0,11	0,14	bd
	10th-11th	Microprobe	59,11	2,97	2,76	12,76	10,76	1,49	1,53	5,10	0,16	0,07	0,11	bd
SA07VL313	10th-11th	Microprobe	58,98	2,17	2,17	14,59	10,01	1,47	0,18	2,67	0,18	bd	0,15	bd
	10th-11th	Microprobe	61,37	2,34	2,05	14,41	10,49	1,37	0,07	2,51	0,31	0,04	0,19	bd
	10th-11th	Microprobe	61,00	2,44	2,25	14,52	9,86	1,59	0,15	2,27	0,17	bd	0,14	0,64
SA07VL96	10th-11th	Microprobe	60,08	10,44	0,66	15,00	4,32	4,26	0,33	1,69	0,44	0,31	0,09	bd
	10th-11th	Microprobe	59,26	10,23	0,57	14,98	4,35	4,30	0,40	1,74	0,54	0,19	0,16	0,36
	10th-11th	Microprobe	59,43	9,97	0,67	15,16	5,16	4,55	0,34	1,71	0,43	0,26	0,13	0,55
SA07VL312	10th-11th	Microprobe	64,27	2,10	2,03	17,47	8,66	1,50	0,09	1,93	0,22	0,10	0,16	0,02
	10th-11th	Microprobe	64,27	2,14	2,15	16,59	8,35	1,50	0,08	1,69	0,20	0,01	0,29	0,06
	10th-11th	Microprobe	61,60	2,18	2,09	16,85	7,79	1,44	0,14	1,45	0,19	0,01	0,07	bd
SA07VL324	10th-11th	Microprobe	62,07	2,17	2,40	14,13	11,52	1,60	0,12	1,38	0,29	0,04	0,31	0,53
	10th-11th	Microprobe	62,09	2,39	2,51	13,85	11,51	1,49	0,11	1,47	0,28	0,01	0,28	0,23
	10th-11th	Microprobe	63,81	2,21	2,42	13,92	11,64	1,55	0,12	1,80	0,32	0,04	0,27	bd
SA07VL378	10th-11th	Microprobe	63,07	2,72	2,82	15,25	9,23	1,61	1,23	2,44	0,24	bd	0,18	bd
	10th-11th	Microprobe	63,22	2,75	2,61	15,21	10,23	1,46	1,25	2,51	0,20	0,01	0,21	bd
	10th-11th	Microprobe	64,46	2,59	2,28	15,14	9,11	1,54	0,02	2,38	0,22	0,11	0,22	bd
SA07VL409	10th-11th	Microprobe	71,78	2,24	1,82	14,76	7,58	1,60	0,12	1,25	0,17	0,01	0,09	bd
	10th-11th	Microprobe	70,18	2,19	1,89	14,19	7,61	1,54	0,08	1,27	0,21	bd	0,23	0,81
	10th-11th	Microprobe	69,06	2,21	2,03	14,51	7,54	1,47	0,11	1,06	0,25	bd	0,16	bd
SA07VL473	10th-11th	Microprobe	66,89	2,20	2,05	14,08	8,79	1,41	0,11	1,43	0,21	0,03	0,18	1,28
	10th-11th	Microprobe	67,67	2,12	2,11	14,15	8,25	1,38	0,12	1,51	0,26	0,07	0,18	0,12
	10th-11th	Microprobe	68,15	2,37	1,93	14,13	8,20	1,54	0,12	1,22	0,26	0,01	0,23	0,50
SA07VL349	10th-11th	Microprobe	66,47	2,15	1,85	15,34	7,22	1,38	0,04	1,05	0,23	0,08	0,06	0,33
	10th-11th	Microprobe	64,76	1,97	1,81	15,53	8,00	1,47	0,05	0,92	0,23	0,12	0,10	bd
	10th-11th	Microprobe	68,22	2,16	1,86	15,26	7,81	1,52	1,15	1,05	0,31	0,07	0,16	bd
SA07VL472	10th-11th	Microprobe	70,04	0,90	2,88	13,10	9,31	2,04	0,04	0,19	0,85	0,49	0,37	bd
	10th-11th	Microprobe	71,71	1,01	2,96	13,38	9,41	1,92	0,10	0,36	0,85	0,56	0,43	0,08
	10th-11th	Microprobe	71,03	0,90	2,88	12,93	9,55	2,10	bd	0,25	0,83	0,74	0,35	bd
SA07VL408	10th-11th	Microprobe	64,45	2,26	2,03	14,23	11,09	1,48	0,16	1,63	0,34	0,11	0,34	bd
	10th-11th	Microprobe	64,00	2,22	2,10	14,47	11,52	1,56	bd	1,82	0,22	0,07	0,30	bd
	10th-11th	Microprobe	64,32	2,30	2,18	14,67	11,53	1,45	0,09	2,04	0,25	0,07	0,27	bd
Sample number	Period	Method	SiO_2 %	Al_2O_3 %	MgO %	Na_2O %	CaO %	K_2O %	TiO_2 %	FeO %	Cl %	MnO %	P_2O_5 %	ZnO %
03JP64	10th-11th	XRF	66,85	1,97	2,45	13,47	7,89	2,63	0,12	0,37		1,27	0,34	
03AP5	10th-11th	XRF	67,10	1,86	2,51	13,55	7,91	2,62	0,11	0,37		1,28	0,35	
SA2004VL33	10th-11th	XRF	63,89	1,88	1,98	15,19	9,3	1,55	0,12	1,98		0,16		

Table 1 Sagalassos: chemical composition of the plant ash.

DISCUSSION AND CONCLUSIONS

During the 7th century, small sites still seem to have been occupied at Sagalassos but, during the 8th to 13th centuries A.D., only isolated hamlets, some of them fortified, occupied parts of the former city of Sagalassos. The measured diameters of the bracelets seem to imply that most of them were worn by children or women around the wrists (and not around the upper arms), which seems to be corroborated by the sex and age identification of the skeletons of the graveyard around the church. It is only possible to conjecture about the popularity of these bracelets. According to Talbot, the changing fashion of women's clothes would have been the catalyst. In the 11th century A.D., trumpet-shaped sleeves would have been cumbersome for women engaged in manual activities. They would have tied the sleeves back with a knot between the shoulder blades. In this way, the wrists and lower arms would have become visible and suitable for ornamentation. This would imply that bracelets were worn only by lower class women. Illustrations on miniatures also support this idea. Upper class women, however, were never depicted with bear arms (since it was stressed that they were not involved in manual labour), so this social interpretation of the occurrence of bracelets in graves should be treated with caution (Talbot 2005, 152-153).

The vessel glass associated with these bracelets was very fragmented and seemed to be of an Early Byzantine (possibly even earlier) date. On the former temple site of Hadrian and Antoninus Pius, a Middle Byzan-

Sample number	Cu_2O %	CoO %	Cr_2O_3 %	SO_3 %	Sb_2O_3 %	PbO %	SnO_2 %	BaO %	SrO %	Total %
SA07VL350	0,17	0,05	bd	0,05	0,12	bd	bd	bd	bd	97,85
	0,05	0,10	bd	0,30	0,31	0,19	bd	bd	bd	99,07
	0,09	0,03	0,02	0,51	0,13	bd	bd	0,25	bd	94,53
	0,08	bd	0,02	0,19	0,22	0,16	bd	bd	bd	97,50
SA07VL313	0,01	bd	0,01	0,38	0,18	bd	bd	bd	bd	93,16
	0,04	bd	0,02	0,34	0,26	bd	bd	bd	bd	95,80
	0,41	bd	0,11	0,38	0,28	0,04	bd	bd	bd	96,26
SA07VL96	bd	bd	bd	0,16	0,52	bd	bd	0,12	bd	98,43
	bd	0,03	0,05	0,23	0,33	0,15	bd	0,12	bd	98,00
	0,21	0,04	0,03	0,34	0,69	0,09	bd	bd	bd	99,77
SA07VL312	0,24	0,01	bd	0,26	0,15	0,13	bd	0,06	bd	99,42
	bd	bd	0,05	0,21	bd	bd	bd	0,06	bd	97,65
	bd	bd	0,06	0,29	0,29	bd	bd	0,06	bd	94,52
SA07VL324	0,03	0,03	0,07	0,11	0,23	bd	bd	bd	bd	97,03
	0,01	bd	bd	0,08	0,20	0,12	bd	bd	bd	96,62
	0,08	0,02	0,06	0,13	0,27	0,12	bd	0,32	bd	99,09
SA07VL378	0,04	bd	0,04	0,27	0,24	bd	bd	bd	bd	99,38
	bd	bd	0,02	0,55	0,12	0,09	bd	0,06	bd	100,52
	0,13	0,06	bd	0,44	0,25	bd	bd	0,06	bd	99,01
SA07VL409	bd	0,02	0,02	0,27	0,25	0,19	bd	0,19	bd	102,35
	bd	0,09	0,09	0,43	0,25	0,01	bd	bd	bd	101,07
	bd	0,04	bd	0,27	0,35	bd	bd	bd	bd	99,05
SA07VL473	0,18	bd	bd	0,44	0,17	bd	bd	0,25	bd	99,70
	0,05	0,03	0,06	0,32	0,34	0,08	bd	bd	bd	98,81
	bd	0,06	0,09	0,38	0,24	0,16	bd	bd	bd	99,59
SA07VL349	0,06	0,03	0,01	0,48	0,21	0,09	bd	bd	bd	97,09
	0,02	0,02	0,01	0,22	0,17	bd	bd	bd	bd	95,41
	0,06	0,05	bd	0,42	0,26	bd	bd	bd	bd	100,36
SA07VL472	0,04	0,06	0,03	0,27	0,17	0,20	bd	0,06	bd	101,04
	0,08	bd	0,04	0,14	0,22	0,10	bd	bd	bd	103,35
	bd	bd	0,01	0,37	0,26	0,02	bd	0,32	bd	102,53
SA07VL408	bd	bd	0,02	0,19	0,22	bd	bd	bd	bd	98,54
	0,08	0,01	bd	0,11	0,34	0,07	bd	bd	bd	98,90
	0,03	0,05	bd	0,11	0,25	bd	bd	0,19	bd	99,80

Sample number	Cu_2O %	CoO %	Cr_2O_3 %	SO_3 %	Sb_2O_3 %	PbO %	SnO_2 %	BaO %	SrO %	Total %
03JP64										97,36
03AP5										97,66
SA2004VL33										96,77

Sample number	Method	$^{87}Sr/^{86}Sr$	$^{143}Nd/^{144}Nd$	ε Nd	Method	Sr ppm	Nd ppm	Sb ppm	Pb ppm	Cu ppm	Zn ppm	Co ppm
03JP64	TIMS	0,70862	0,512357	-5,5	XRF-TIMS	485	7	bd	11	bd	30	bd
03AP5	TIMS	0,70289	nd	nd	XRF	489	bd	bd	10	bd	25	bd
SA2004VL33	TIMS	0,70836	0,512269	-7,2								

Table 1 Continued.

tine phase was recognised. The discovery of two chunks of plant ash glass in this assemblage was striking. Since a post-8th century occupation of Sagalassos has already been established, it came as no surprise that plant ash glass was excavated. However, the chunks of plant ash glass were rather unexpected, indicating that local glass working still took place (whether vessel blowing or the production of bracelets) in this late period, when occupation was reduced to a very few small nuclei, and that maybe even »old« natron glass was remelted together with this plant ash glass.

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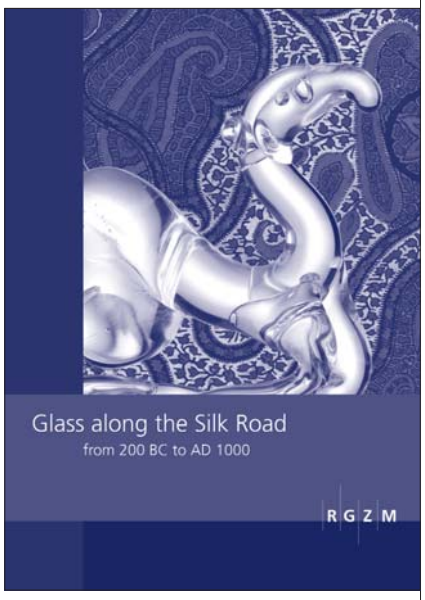
ABSTRACT / ZUSAMMENFASSUNG / RÉSUMÉ

Middle Byzantine (10th-13th century A.D.) glass bracelets at Sagalassos (SW Turkey)
Middle Byzantine glass bracelets of Sagalassos show a wide variety of types. It is presumed that the site still knew a Middle Byzantine glass workshop that used plant ash glass that may have been recycled together with natron glass.

Mittelbyzantinische (10.-13. Jahrhundert) Glasarmringe aus Sagalassos (Südwesttürkei)
Mittelbyzantinische Glasarmreife aus Sagalassos weisen eine große Typenvielfalt auf. Es wird angenommen, dass der Fundort immer noch eine mittelbyzantinische Glaswerkstätte besaß, welche Pflanzenaschenglas verwendete, das möglicherweise zusammen mit Natronglas wieder eingeschmolzen wurde. D. K.

Les bracelets en verre du milieu de l'époque byzantine (10e-13e siècle)
à Sagalassos (du sud ouest de la Turquie)
Des bracelets en verre de l'époque byzantine moyenne de Sagalassos présentent une grande diversité de types. Il est admis que le lieu de fouille possédait toujours encore un atelier de verre de l'époque byzantin moyen qui utilisait du verre provenant de cendres de plantes et qui fut peut-être refondu avec du verre de soude. E. L.



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Glass along the Silk Road from 200 BC to AD 1000

International conference within the scope of the »Sino-German Project on Cultural Heritage Preservation« of the RGZM and the Shaanxi Provincial Institute of Archaeology, December 11th-12th 2008

Since Antiquity the routes of the so-called Silk Road formed an important network for commercial, cultural and technological exchange and connected the East to the West. Since glass never played a significant role in Far Eastern cultures, glass finds from Far Eastern sites provide evidence for far-reaching trade relationships and imply cross-fertilization with other cultures. Thus the contributions in this volume deal with a wide geographical area covering a chronological range from 200 BC to AD 1000. The conference focused on recent results of scientific analyses of glass and on archaeological questions. The possibility of interdisciplinary research was one of the focal points of the conference and hence of this volume, as well as questions concerning workshops, raw material, technology and trade. One goal was to provide the participants with an insight beyond their own immediate concerns. By means of presenting studies of regionally specific glass forms and techniques as well as current methods and discoveries, even when not directly connected to the Silk Road, a broader perspective is offered.

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Zur Ausstellung »Byzanz – Pracht und Alltag« die in Bonn vom 26.2.-13.6.2010 sattfand, erscheint im Verlag des Römisch-Germanischen Zentralmuseums ein dreiteiliger wissenschaftlicher Begleitband.
Von seinen Wurzeln in der römischen Spätantike bis zu seinem Niedergang im Jahre 1453 durch die Eroberung der Hauptstadt Konstantinopel war das Byzantinische Reich von einer faszinierenden Vielfalt geprägt. Byzantinische Kultur und Handwerkskunst beeinflussten über die Jahrhunderte nicht nur westeuropäische Gesellschaften.
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